

# VICTORIA'S SECRET

BCRF



## *“The Fearless Collection”*

An everyday health tech bra collection providing wearable, accessible early breast cancer detection tools, empowering individuals to take control of their breast health without fear.

# EXECUTIVE SUMMARY

**“1 in 8 women in the United States will be diagnosed with breast cancer in her lifetime. ... But there is hope. When caught in its earliest, localized stages, the 5-year relative survival rate is 99%”** (Shockney, 2023). Breast cancer is an extremely daunting disease, and you most likely know someone who has been affected by it. Even though it's well known that the disease is most treatable when caught in early stages, it can be extremely difficult sometimes to face the reality of getting examined. Whether it's a fear of the examination itself, the unknown, or the prospect of facing something, there's a level of intimidation in examining one's health that becomes a barrier to entry for many individuals. However, staying in charge of your breast health doesn't have to be so scary.

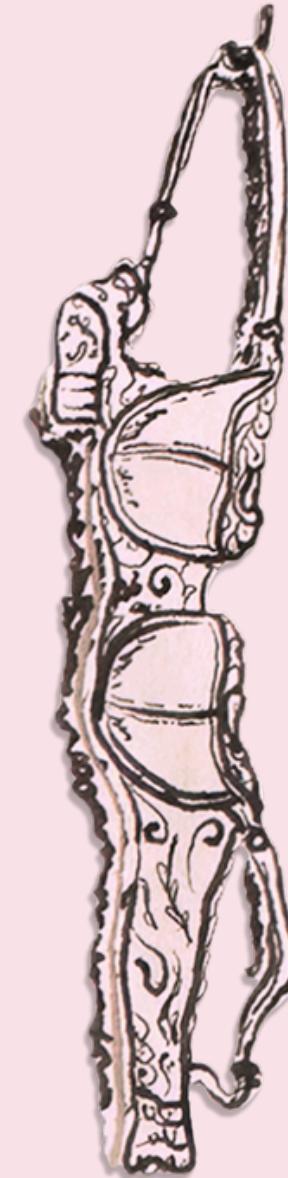
**That's where “The Fearless Collection” can step in, an ambitious cross-industry collaborative breakthrough with Victoria's Secret and the Breast Cancer Research Foundation.** This partnership across the health and fashion industries carves the path for the future of wearable health technological advancements and AI integrative use. The collection is made for any individual who wears a bra, and the goal of the partnership is to create a space where customers can easily and proactively take care of their health without any discomfort, judgment, or fear. The collection utilizes textile-based microwave antenna sensor technology pulled from research teams around the world. To translate the data, the collection utilizes **Clarity Breast**, the first FDA-authorized AI breast health platform, to analyze and identify a personal care plan for each of our customers.

**“The Fearless Collection” is the future of wearable technology and a guideline as to how collaborations between industries can help save lives by bringing accessible, full-time, prevention awareness.**



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# WHY VICTORIA'S SECRET?

**“One bra is sold every five seconds” (Victoria's Secret, 2025)**

Victoria's Secret is a global leader in the intimate apparel market, and is very well known for its innovative, fashion-inspired collections. “Victoria's Secret is a timeless staple for sexy, glamorous, and affordable luxury for women around the world” (Victoria's Secret & Co., 2025).

## STRENGTHS

Victoria's Secret is one of the most recognizable brands when it comes to bras. Therefore, their **strong brand recognition, extensive retail presence, wide variety of product offerings, and established supply chains** bode well for this collection concept (Joel, 2025). They also have **strong marketing tactics, innovative collections, and high-quality products** (The Strategy Story, n.d.).

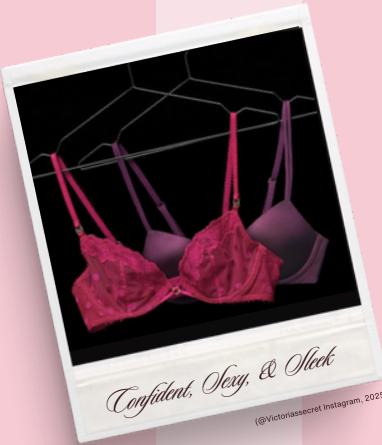
## OPPORTUNITIES

With such a strong market influence, there is room for new business approaches. VS can increase **inclusivity and diversity**, especially with their wide age demographic. They can pursue **collaborations, personalization, sustainability, and health and wellness** (The Strategy Story, n.d.). **This collection would target increased age inclusivity, collaboration, sustainability, and health.**

## INITIATIVES FOR BREAST HEALTH

VS already has an established value in women's breast health. Whether its supporting women through the healing process with their **mastectomy and post-surgical bras**, or through the **Victoria's Secret Global Fund for Women's Cancers** to accelerate innovation in cancer research for women, by women, they have shown that women's breast health is a priority to their company.

**“Since launching in 2021, The Global Fund has invested more than \$13 million in research grants to progress prevention, detection, and treatment methods for women's cancers, led by women scientists working globally”** (VS& CO. Cancer Research, 2025).



# WHY BCRF?

“The BCRF is the nation’s first and largest not-for-profit organization dedicated to funding clinical and genetic research on breast cancer” (Neoplasia, 2002). **In a time of uncertainty, where women’s cancer research project funding is freezing or cut altogether, the Breast Cancer Research Foundation is strengthening its commitment to ensuring continued progress in the effort to eradicate breast cancer** (BCRF, 2025).

## STRENGTHS

The BCRF is accelerating scientific breakthroughs by growing the volume and speed of essential research development in topics like prevention, novel treatments, and a cure. They have **the network of scientific research and data, and the financial standing** to pull together the best technology for the product with the most accurate models. Their **global impact as a foundation and brand recognition** would alleviate the customers’ fear through **product legitimacy**.

## OPPORTUNITIES

The BCRF has a direct opportunity to reach a larger demographic of individuals and positively impact their everyday lives through a product offering. **This collaboration would effectively combine the expert on breast health research and technology with the expert on the bra, along with the first AI breast health tech company in the industry.** All of these pieces need each other to maximize the success of the opportunity and the global reach.

# WHY CLAIRITY?

“Clairity’s mission is grounded in the belief that everyone deserves to understand their health risks, regardless of race, ethnicity, or gender” (Clairity, 2025). Clairity Breast, specifically, is an AI tool that we can utilize in this concept to provide our customers with real-time future risk predictions of developing breast cancer. **Advancements in AI and computer vision can help deliver validated, equitable risk assessments to expand access to life-saving early detection and prevention for women everywhere** (Lehman, 2025). Working with Clairity and utilizing their AI coding technology would allow us to connect real-time results to our customers in an accessible manner.



# WEARABLE TECH IN FASHION

Wearable tech and AI are two tools that have begun to show up in the industry in innovative new ways to create drastic changes, especially in relation to health and wellness. The fashion industry is a sweet spot for wearable technology to thrive, with the industry's wide range of design, lifestyle, functionality, and scalability capacities (Koo, S., Chae, Y., 2022). Current examples of this integration with health tech in fashion can be shown through products such as the **Gucci x Oura ring**, the **Levi's Trucker Jacket with Jacquard Google**, and the **Ray Ban Meta Smart Glasses**. The benefits of wearable tech are currently being explored, as there are a multitude of possibilities and solutions that can be addressed. **“Considerable literature findings suggest that wearables can empower individuals by assisting with diagnosis, behavior change, and self-monitoring”** (Kang, 2022).



## THE FUTURE OF WELLNESS

### HEALTH AT HOME

“At home diagnostic tests are appealing to consumers because they offer greater convenience than going to a doctor’s office, quicker results, and the ability to test frequently” (Callaghan et al., 2024)

### PERSONALIZATION

“One in five US consumers and one in three US millennials prefer personalized products and services.” This leaves opportunity for AI to come in and offer more precision and customization to a larger group of individuals. (Callaghan et al., 2024)

### BIOMONITORING

Wearable devices such as watches have been popular in the market for years, but new breakthrough technologies allow for strong improvements in biomonitoring in ways beyond what’s been explored already. (Callaghan et al., 2024)

# ACCESSIBILITY IN HEALTH

Within global healthcare systems, it's very often that sex and gender biases play a role that leads to women and transgender individuals' healthcare being underrepresented, understudied, under-protected, and underserved. **"Persistent gender inequalities, socioeconomic divides, and racial-ethnic discrimination, particularly in low-resource communities, have exacerbated women's health concerns, delaying advancements in care and accessibility."** However, with the recent developments in wearable devices and tracking technologies, **biomonitoring key biomarkers is a promising start to provide for underserved communities** in ways they may not have experienced yet, facilitating early disease diagnosis for women and transgender individuals of all ages (Moghimikandelousi, 2025). Health care can feel intimidating, overwhelming, and like a financial burden; however, **accessible health care made easy is the key to increasing global self-proactive treatment.**

**"To thrive in the evolving wellness market, brands must go beyond product innovation to deliver clarity, transparency, affordability, and trust."** Marta Cyhan Bowles - Chief Communications Officer & Head of Global Marketing COE (NIQ, 2025)

## THE CONSUMER CRAVES...

### 1. Familiarity

→ Putting on a bra and checking updates on an app

### 2. Trust

→ Collaborating with two trusted, recognizable, powerhouse companies

### 3. Transparency

→ Quick proactive medical summaries straight to your device

### 4. Preventive Care

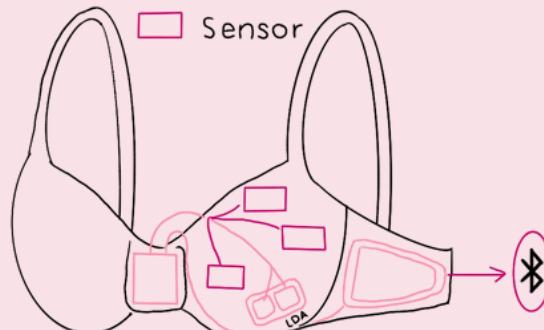
→ Catching developing signs of breast cancer before they develop further

# THE CONCEPT

“The Fearless Collection” is a 12 CC breakthrough launch of wearable technology integrated into Victoria’s Secret’s everyday accessible options, from comfort t-shirt bras to sexy, playful push-ups. **The 12 CC collection will fall into 4 popular category styles: Body by Victoria, Dream Angels, Love Cloud, and Victoria’s Secret, all in 3 varying color ways.** The collection will utilize textile-based **flexible microwave antenna sensors** strategically placed and designed to fit seamlessly into the bra, without any discomfort for the customer. “The Fearless Collection” bra **requires a fuller bra lining in all of its styles to allow for seamless support surrounding the sensors.** For the customer’s ease of use and sustainable longevity of the bra and the technology, the sensor technology is removable, and the bra is safe to wash. The collection would launch online only, in its first run, through Victoria’s Secret’s e-commerce platforms. After the initial launch and collection engagement is reviewed, the line will launch in select key global stores.

Victoria’s Secret and the Breast Cancer Research Foundation have shared values in accessibility, women’s wellness and confidence, innovation, research, diversity, collaboration, and transparency. These two companies showcase their love through their investment into quality research and quality product, and “The Fearless Collection” is a beautiful opportunity to provide their communities with a product that could save lives and promote those very shared values.

More information in Appendix A\*



\*Redrawn mockup model from (Elsheakh, et. al., 2023)

## HOW IT WORKS

**Microwave imaging and detection systems technology** is an effective solution for this specific product, as it provides **clear imaging resolution, is safe, pain-free, has a lower cost, and requires less scanning time for results**. For best results, a cotton lining closest to the skin is the best fabric to lie between the sensor and the skin. As for the metallization technology, a CPW-based monopole antenna was determined as the most effective, tolerant, and flexible antenna. There is a flexible Roger substrate and a textile-based antenna connected to an SMA cable at one side and the other side to a VNA (Elsheakh, et. al., 2023). The antenna is strategically designed to mold into the shape of the bra cup. **The sensors can connect through Bluetooth to the user’s Clarity App interface**, where their AI tools track and identify the embedded imaging and data to provide real-time health risks and recommendations on clinical follow-ups.

The goal is NOT to replace professional care with microwave sensing and AI tracking. It is rather to utilize this tool at a much more frequent rate than women typically go get a mammogram, to catch something before it becomes more serious.

# CUSTOMER PROFILES

## MEET MANYA, AGE 19

**Manya just moved across the country** from Georgia to attend UCLA as a freshman! She's extremely excited, but **she has no familiar medical providers in LA** and has never really thought about taking her healthcare into her own hands before. She knows she has to be very on top of her breast health because **her mom and her grandma both had breast cancer**, and **Manya unfortunately carries the BRCA gene**. This is really scary for her; it feels like impending doom weighing on her chest constantly.

One day, Manya was scrolling on Instagram and saw a VS ad campaign about "The Fearless Collection". She knew exactly what it felt like to be afraid, and she really wanted that fear to go away. She invested in a bra and has felt **so much more comfortable in her own skin with just a little extra security**.



(Pinterest, 2025)



(Pinterest, 2024)

## MEET DANI, AGE 45

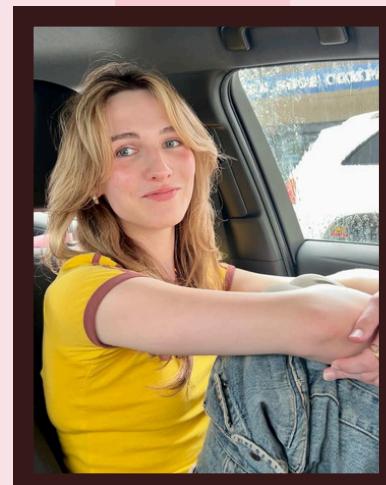
Dani is a loving mom who is constantly busy taking care of her family, but sometimes forgets to take care of herself. **She hasn't gotten a mammogram in the past 4 years because it's completely slipped her mind**. She cares about her health, but it's **not her priority**. Dani just can't handle another stressor in her life! **She needs something easy that can carry the workload for her so she doesn't have to think about her breast health until necessary**.

Dani found out about the VS "Fearless Collection" on Mom-Tok, and **her new bra has given her immense peace of mind**. Now Dani's breast health has become a priority, and she's found herself much more willing to get checked.

## MEET PARKER, AGE 27

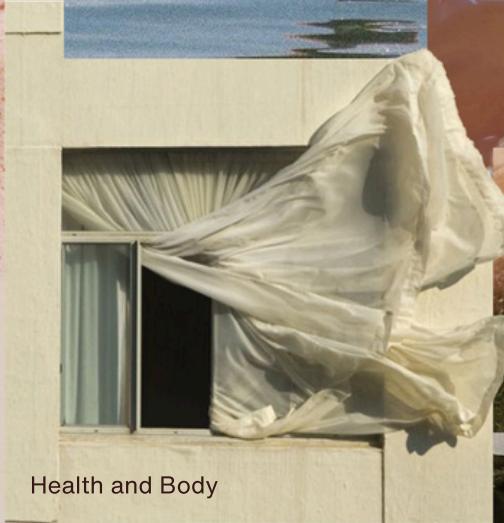
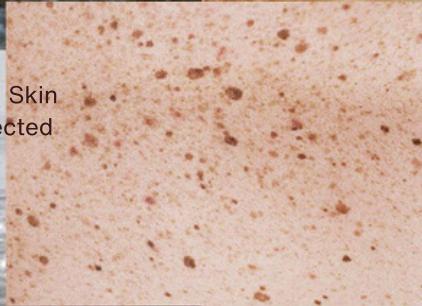
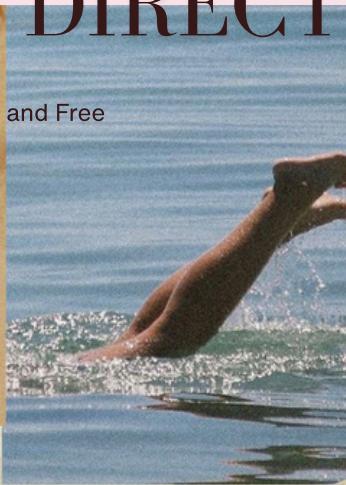
Parker is a proud, transgender woman whose confidence shines in so many ways; however, **she experiences a lot of fear and anxiety when it comes to her breasts**. She had one breast examination when she first turned 21, but it made her extremely uncomfortable, and since then, she's avoided getting examined. Plus, in her mind, she's saving money!

Parker has always loved Victoria's Secret because their bras make her feel sexy. She saw an article about "The Fearless Collection" breaking ground on the VS runway and was shocked to see something so medically innovative, still aesthetically enticing. It inspired her to invest in a piece, and **it has restructured the way she aligns feeling sexy with feeling healthy**.



(@Parkerlemmen Insta, 2024)

# CONCEPTUAL DIRECTION



Confidence In Your Skin

Fearless and Free

Persuit of Life

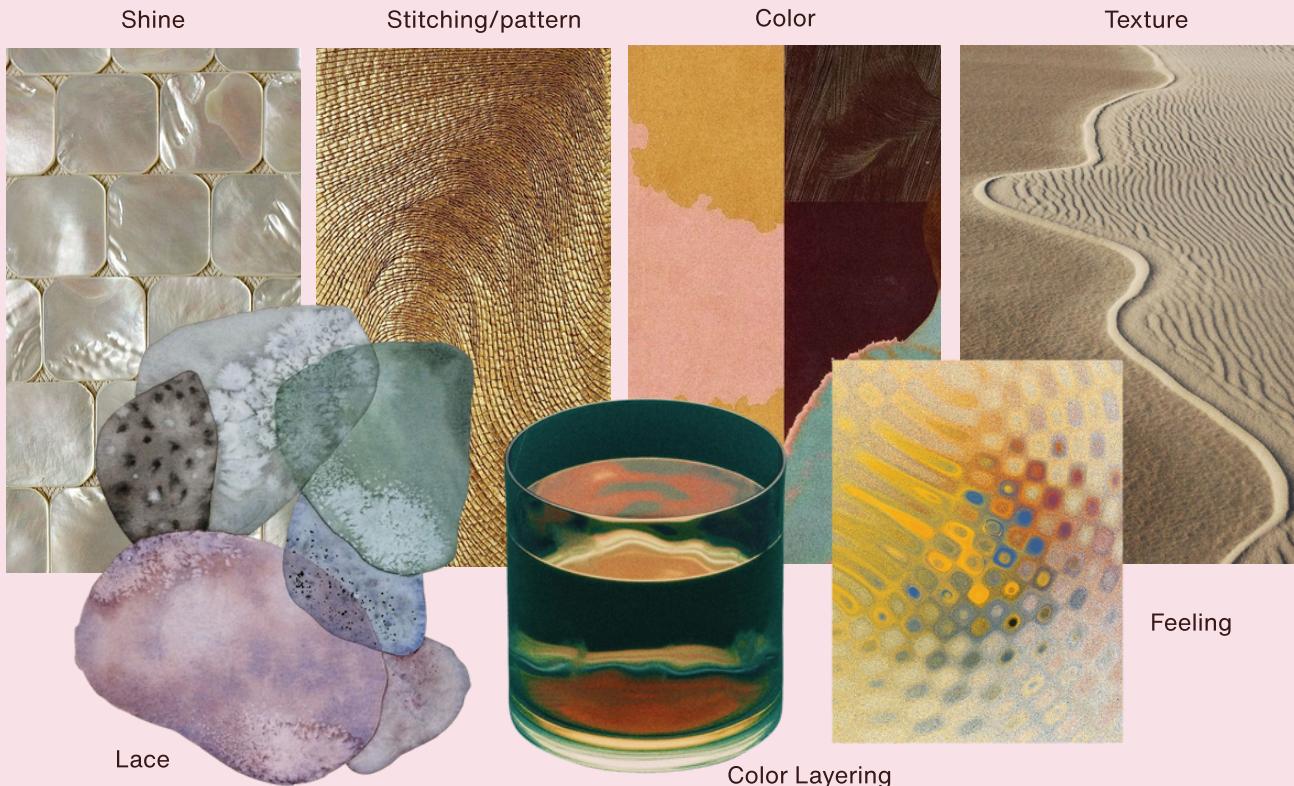
Health and Body

# DESIGN DETAILS

## STYLES



## DETAILS



## FABRICS



100% Organic Cotton



Recycled Polyester

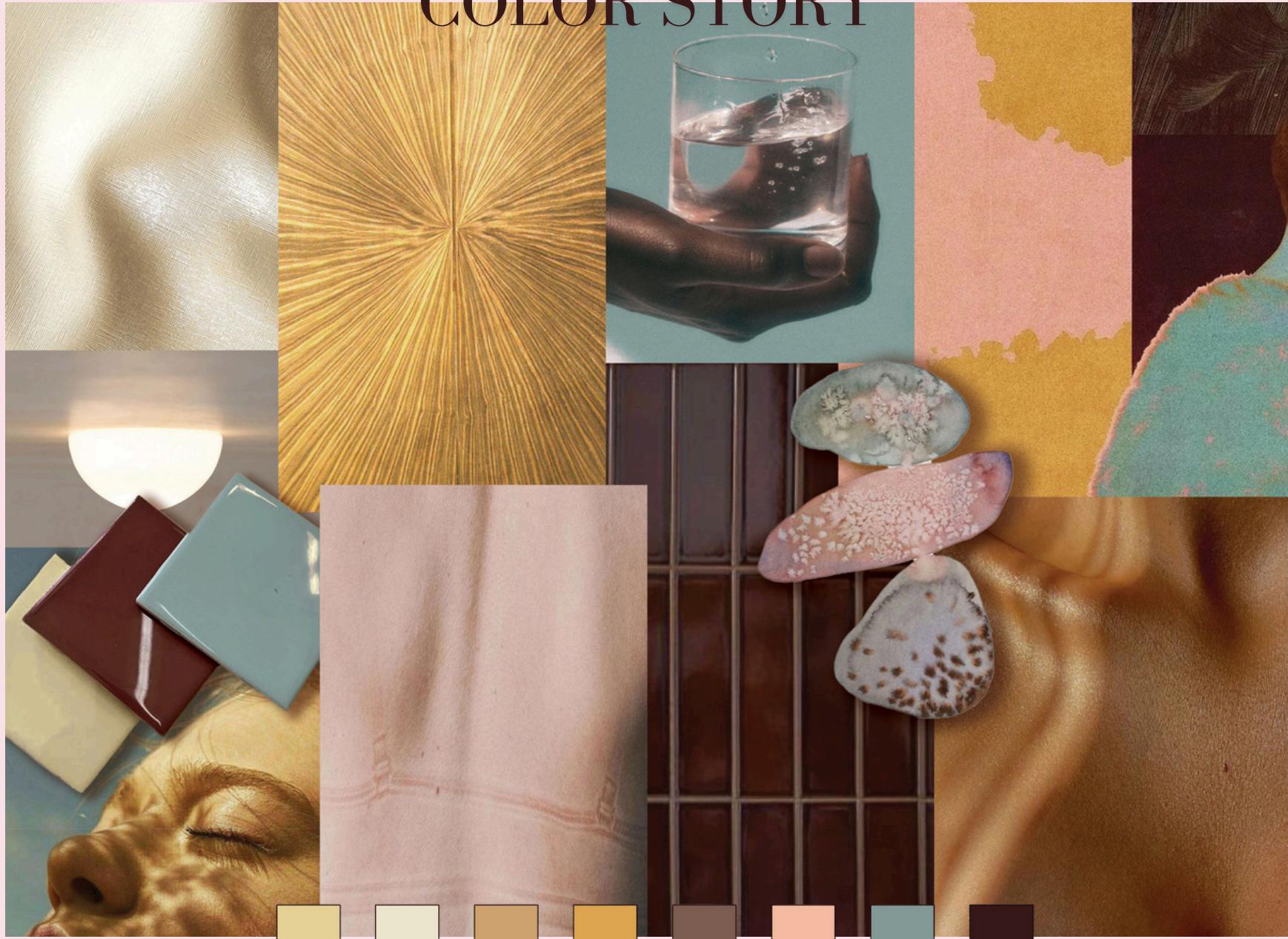


Recycled Stretch Lace



Recycled Satin Viscose

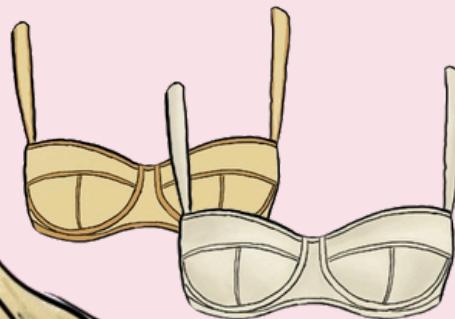
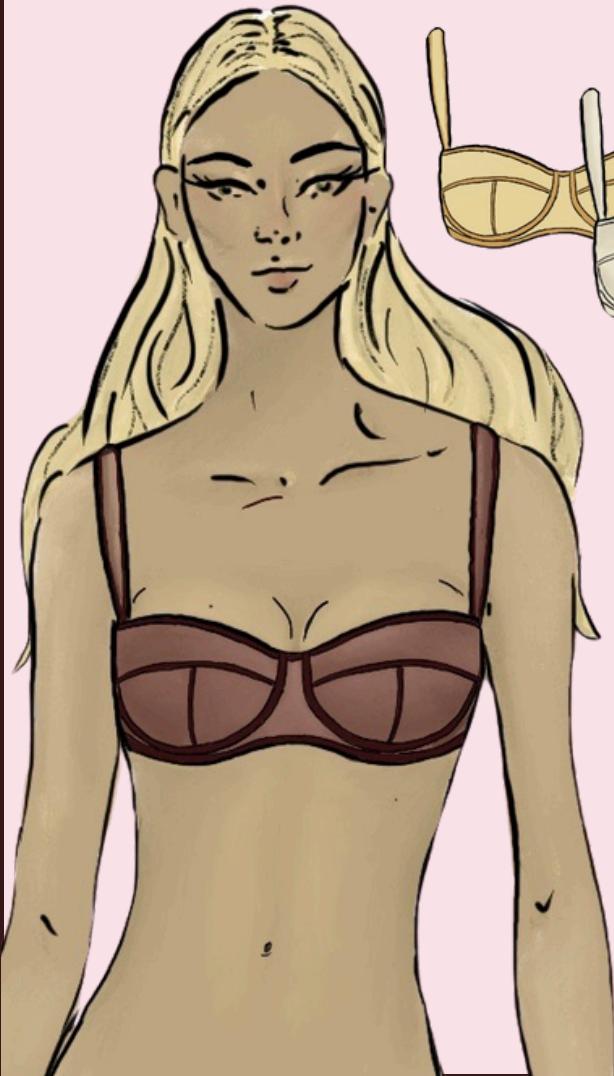
# COLOR STORY



# THE FEARLESS COLLECTION

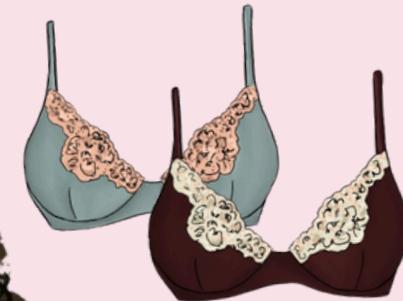
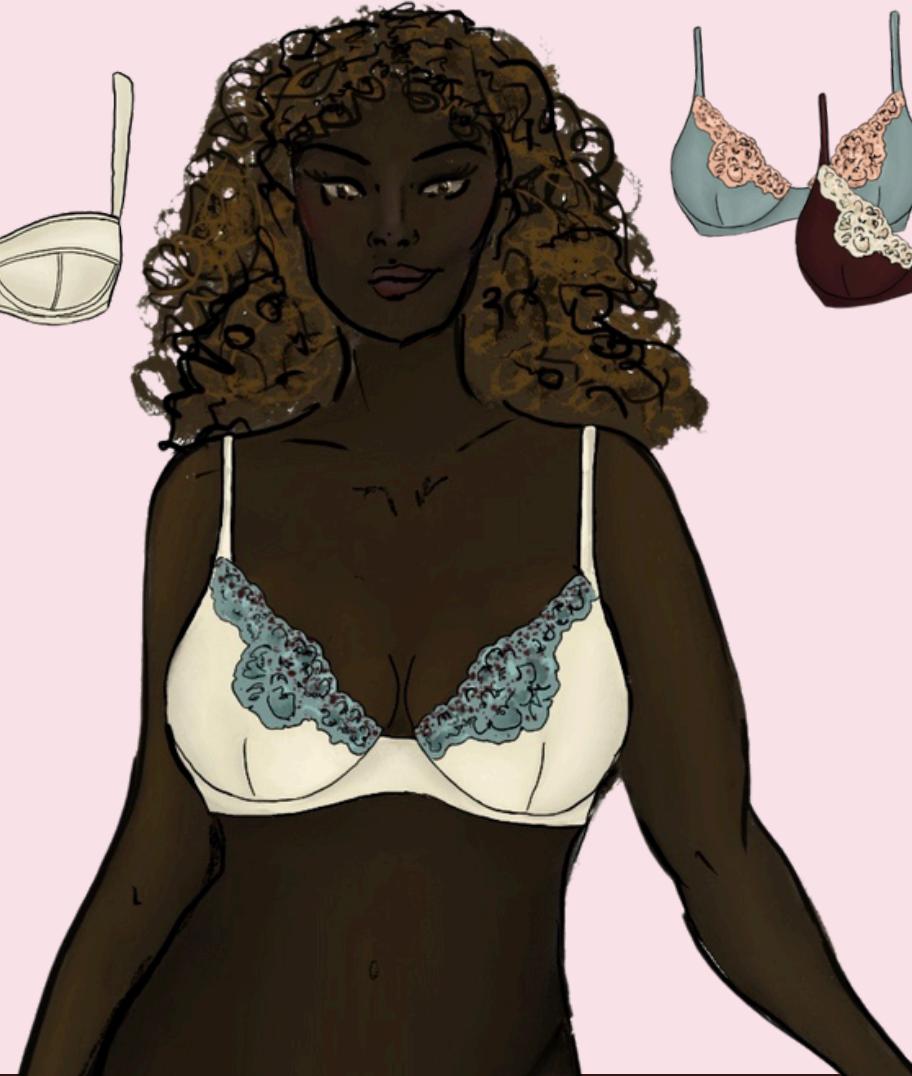
## FEARLESS BALCONETTE PUSH UP BRA

Victoria's Secret



## FEARLESS LACE PUSH UP BRA

Dream Angels Collection



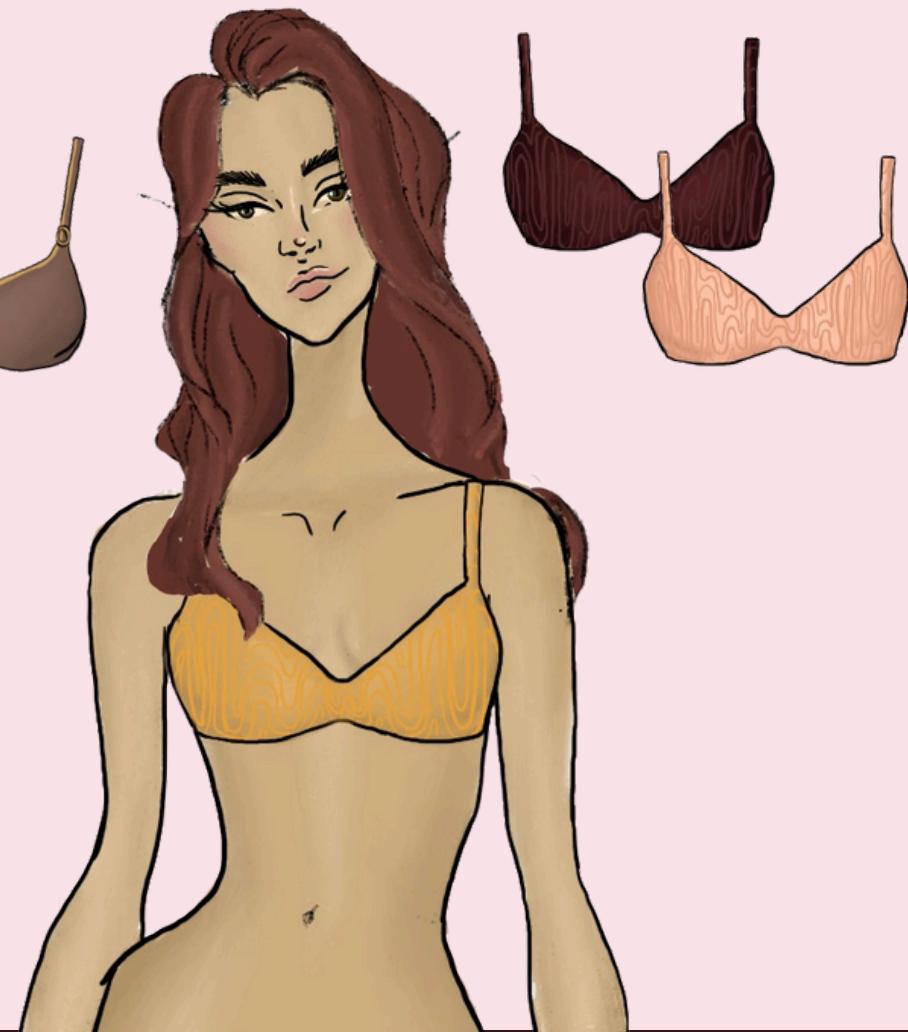
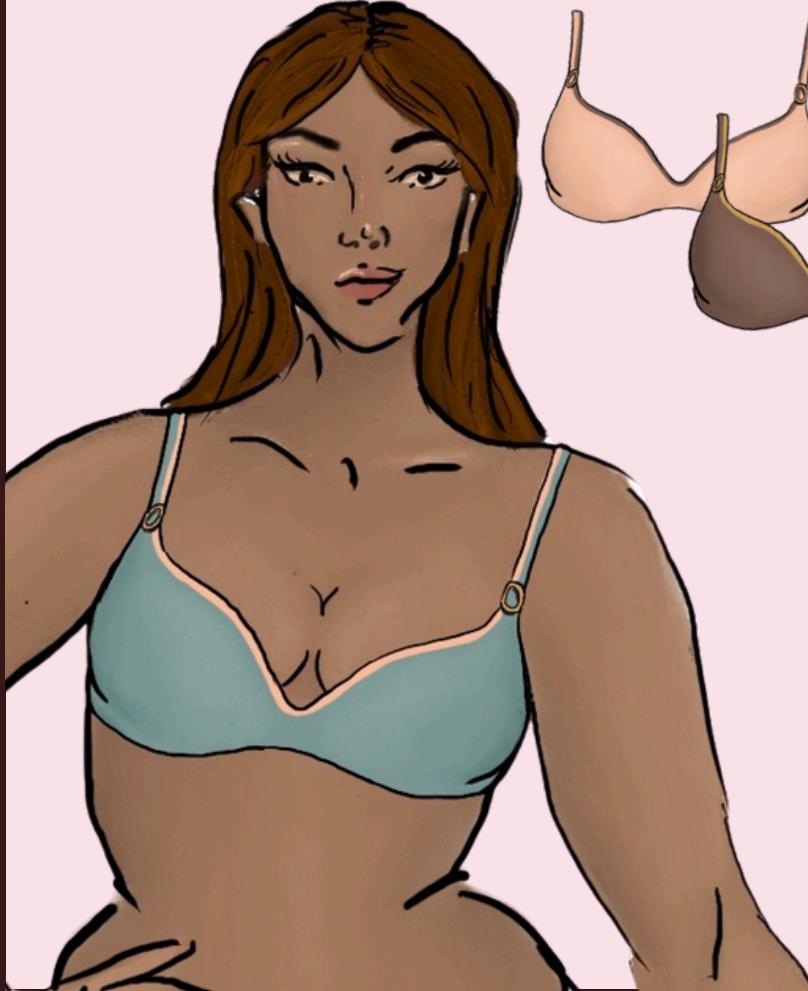
# THE FEARLESS COLLECTION

FEARLESS PERFECT  
SHAPE PUSH UP BRA

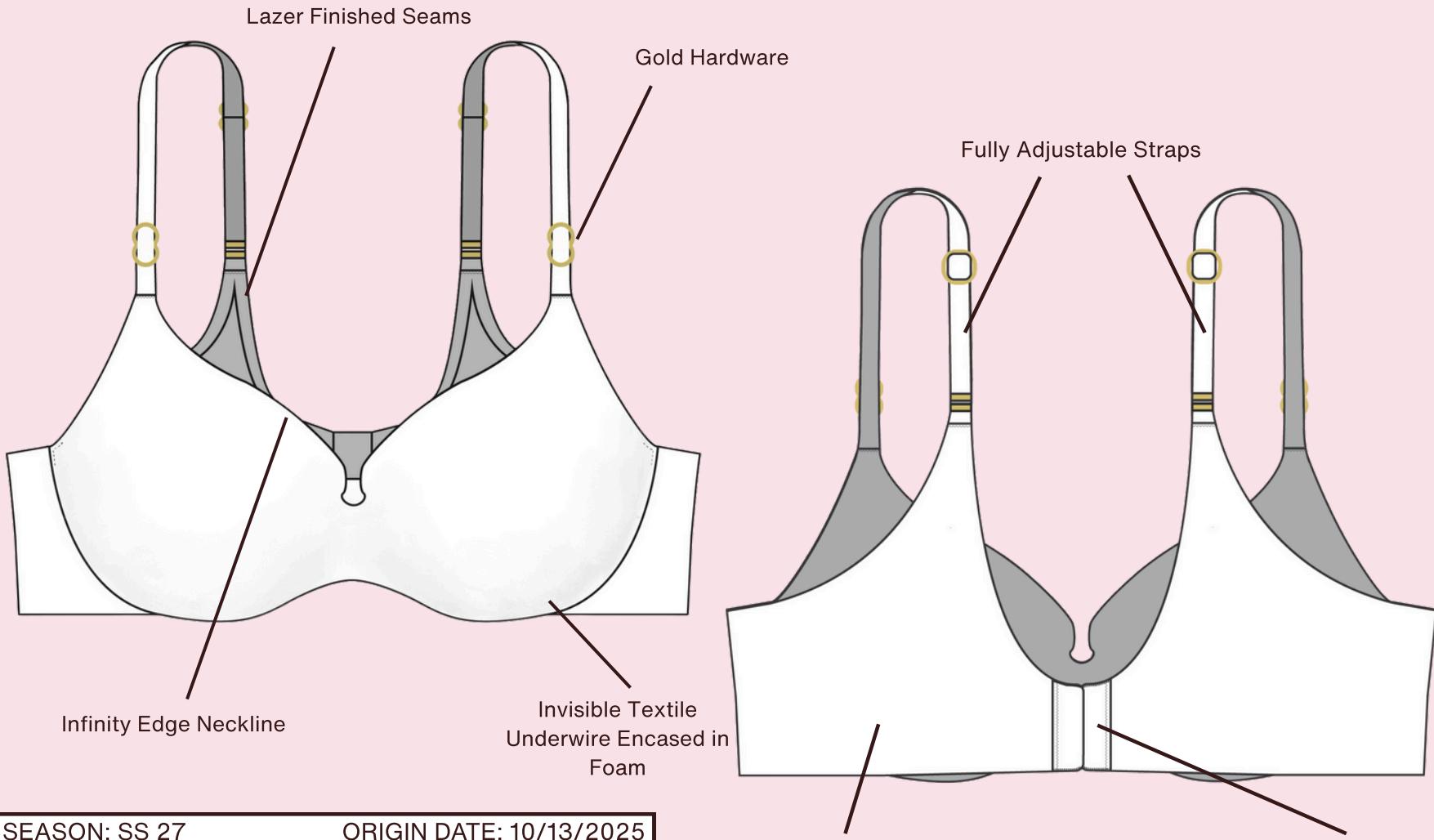
Love Cloud

FEARLESS LIGHTLY LINED  
PLUNGE DEMI BRA

Body By Victoria



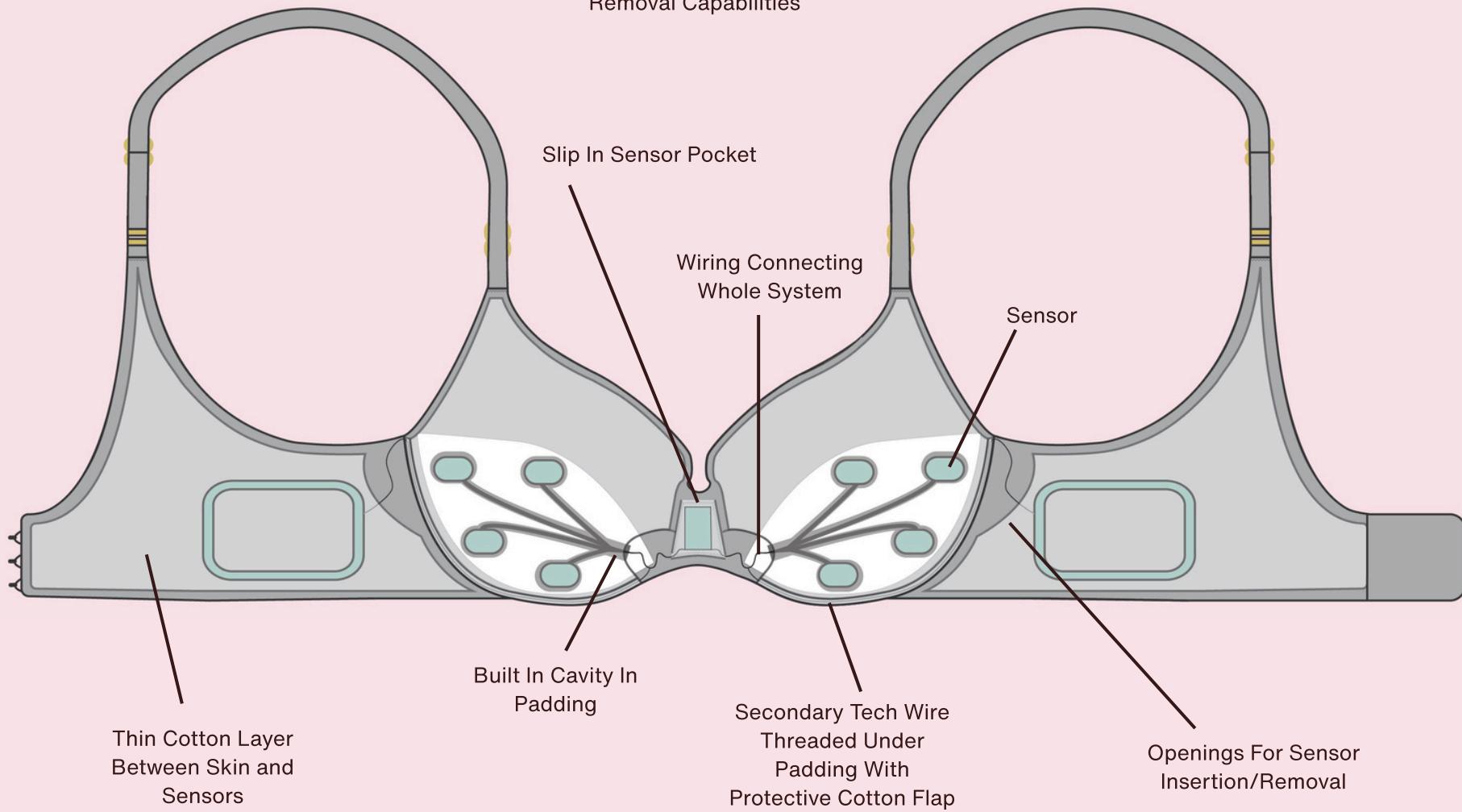
# TECHNICAL FLATS



SEASON: SS 27	ORIGIN DATE: 10/13/2025
STYLE NO: 8146132	SIZE RUN: 32A - 40F
STYLE NAME: FEARLESS	DEVELOPER:
PERFECT SHAPE PUSH UP	VICTORIA'S SECRET

# INTERIOR TECHNICAL FLAT

\*Designed for Full Tech Insertion and Removal Capabilities

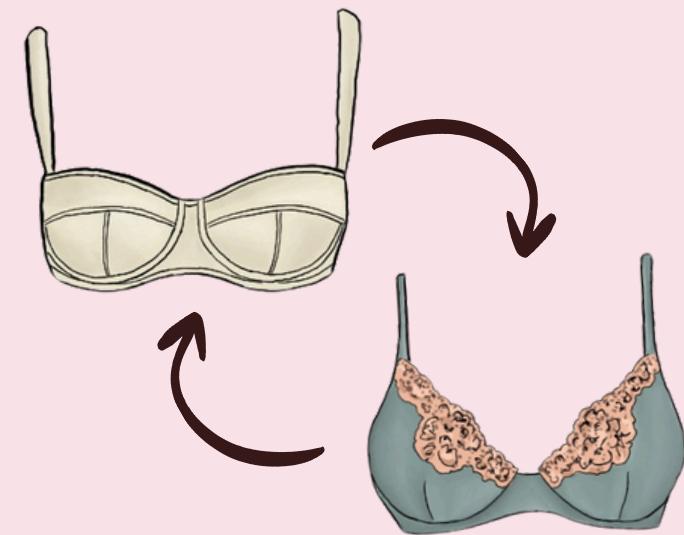


# SUSTAINABLE USE

Sustainability is at the forefront of every decision made regarding “The Fearless Collection”. **This is a product designed to last, with quality materials, and a system that keeps the customer in the loop.** Each Fearless Collection bra

comes with a **5-year warranty for both the tech and the bra**. This warranty allows the customer the most updated and accurate technology to ensure that the intended use of the product is effective. **That means that once a customer invests in a Fearless Bra, they won't have to worry about being left behind, and we can continue to innovate our detection accuracy.** Additionally, because the

tech and the bra can be separated, our customer can switch between any Fearless Bra they love. In general, a Fearless Bra is meant to be worn once a month with the technology, so the bra should last a long time for each customer. However, if they ever wish to replace their Fearless Bra, separate from the technology, we will honor the 5-year warranty for one trade-in.



# MARKETING & PROMOTION

Campaigns for the collection will have the overarching theme that **“Health is Sexy” and “Fearless Looks Good On You”**. Marketing will portray the idea that taking care of your breast health doesn't have to be scary; it can be empowering. Photos will convey the body interacting with nature, and the model's confidence will shine through.

**Another main way the collection will be promoted is through the VS Runway Show, to showcase how sexy, effortless, and comfortable the Fearless Bra is.** Victoria's Secret has recently attempted to modernize its runway in a way that still feels like a classic VS Show, and this is one way to do it. **A modern, inclusive, innovative product showcased in the traditional VS way.**

# COLLECTION EXPANSION

As the e-commerce digital trial provides us with sales data and consumer feedback, we can then start to supply select global store locations with the collection. **The collaboration is intended to grow and develop as new investments in women's health research continue.** Therefore, the partnership, if successful for both parties, can grow into new ventures moving forward, along with the expansion of the collection and accessible selling points globally.

# CONCLUSION



"The Fearless Collection" is a groundbreaking cross-industry collaboration with Victoria's Secret and the Breast Cancer Research Foundation, utilizing wearable health technology and AI tools to provide accessible early breast cancer detection. With this collection, any individual who wears a bra can easily and proactively manage their breast health without any discomfort, judgment, or fear.

## BIG HITTERS

### 1. Product Intention

→ Fearless Bra tech will never replace a medical professional; it rather gives individuals the chance to monitor themselves, increasing their confidence and catching threats early, leading to less severe cancer development.

### 2. Company Moral Alignment

→ This project creates a powerhouse partnership in the fight for women's breast health and women's health opportunities, while creating a physical product offering that VS and BCRF can provide for their communities that aligns with both companies' mission and morals.

### 3. Global Market Trend Alignment

→ The market is quickly jumping onto opportunities centered around wearable technology, AI integration, health and wellness, and sustainable product longevity. The Fearless Collection can set the tone that other companies follow.

### 4. Room For Growth

→ There is not only an immense growth opportunity for a product offering of this sort, but there is also research growth opportunities as the product continues to expand. With the 5-year warranty, continued research and improvement are possible and encouraged; the potential is limitless.

# ARTICLE REFERENCES

Aboagye, S. O., Hunt, J. A., Ball, G., & Wei, Y. (2024). Portable noninvasive technologies for early breast cancer detection: A systematic review. \*Computers in Biology and Medicine, 182,\* 109219. <https://doi.org/10.1016/j.combiomed.2024.109219>

BCRF. (2025). Breast cancer research funding cuts 2025. Breast Cancer Research Foundation. <https://www.bcrf.org/blog/breast-cancer-research-funding-cuts-2025/>

Callaghan, A., et al. (2024). The trends defining the \$1.8 trillion global wellness market in 2024. McKinsey & Company. <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/the-trends-defining-the-1-point-8-trillion-dollar-global-wellness-market-in-2024>

Clairity. (2025). About us. Clairity. <https://clairity.com/about/>

Elsheakh, D. N., Mohamed, R. A., Fahmy, O. M., Ezzat, K., & Eldamak, A. R. (2023). Complete breast cancer detection and monitoring system by using microwave textile based antenna sensors. \*Biosensors, 13\*(1), 87. <https://doi.org/10.3390/bios13010087>

Farag, O., Mohamed, M., Abd El Ghany, M., & Hofmann, K. (2018). Integrated sensors for early breast cancer diagnostics. \*2018 IEEE 21st International Symposium on Design and Diagnostics of Electronic Circuits & Systems (DDECS)\* (pp. 153–157). IEEE. <https://doi.org/10.1109/DDECS.2018.00034>

Joel. (2025). Bra market: A deep dive into the top 10 players—Comparative analysis, market share, revenue, and growth strategies. FnF Research. <https://www.fnfresearch.com/blog/bra-market-a-deep-dive-into-the-top-10-players-comparative-analysis-market-share-revenue-and-growth-strategies/608>

Kang, M. (2022). Breast cancer detection using microwave imaging: A review. \*Neoplasia, 24\*(1), 12–21. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9330198/>

Koo, S., & Chae, Y. (2022). Wearable technology in fashion. In Y. A. Lee (Ed.), \*Leading edge technologies in fashion innovation\* (pp. 49–67). Palgrave Macmillan. [https://doi.org/10.1007/978-3-030-91135-5\\_3](https://doi.org/10.1007/978-3-030-91135-5_3)

Lehman. (2025). Clairity homepage. Clairity. <https://clairity.com/>

Moghimikandousi, S., Najm, L., Lee, Y., et al. (2025). Advances in biomonitoring technologies for women's health. \*Nature Communications, 16,\* 8507. <https://doi.org/10.1038/s41467-025-63501-3>

Neoplasia. (2002). Neoplasia journal article archive. <https://pmc.ncbi.nlm.nih.gov/articles/PMC1550330/>

NIQ. (2025). NIQ report reveals 2025 global health and wellness trends. NielsenIQ. <https://nielseniq.com/global/en/news-center/2025/niq-report-reveals-2025-global-health-wellness-trends/>

Särestöniemi, M., et al. (2022). Breast cancer detection feasibility with UWB flexible antennas on wearable monitoring vest. \*2022 IEEE International Conference on Pervasive Computing and Communications Workshops (PerCom Workshops)\* (pp. 751–756). IEEE. <https://doi.org/10.1109/PerComWorkshops53856.2022.9767512>

Shockney, L. D. (2023). Breast cancer facts. National Breast Cancer Foundation. <https://www.nationalbreastcancer.org/breast-cancer-facts/The-Strategy-Story.> (n.d.). Victoria's Secret SWOT analysis. <https://thestrategystory.com/blog/victorias-secret-swot-analysis/>

Trafton, A. (2023). A wearable ultrasound scanner for breast cancer detection. MIT News. <https://news.mit.edu/2023/wearable-ultrasound-scanner-breast-cancer-0728>

Victoria's Secret & Co. (2025). About us. <https://www.victoriasssecretandco.com/our-company/about-us/#:~:text=The%20Victoria's%20Secret%20brand%20is,for%20women%20around%20the%20world>

Victoria's Secret & Co. (2025). The Victoria's Secret Global Fund for Women's Cancers. <https://www.victoriasssecretandco.com/community/cancer-support/the-victorias-secret-global-fund-for-womens-cancers>

Victoria's Secret. (2025). Mastectomy and post-surgical bras. <https://www.victoriasssecret.com/us/vs/bras/mastectomy?scroll=true>



# IMAGE REFERENCES

@BCRF. (2025, October). Instagram post. Instagram.

[https://www.instagram.com/p/DPUUuLKD41z/?utm\\_source=ig\\_web\\_copy\\_link&igsh=cWwxZ3cxb3IzZDA4](https://www.instagram.com/p/DPUUuLKD41z/?utm_source=ig_web_copy_link&igsh=cWwxZ3cxb3IzZDA4)

@Victoriassecret. (2025, October). Instagram post. Instagram.

[https://www.instagram.com/p/DN0i0cx3LPa/?utm\\_source=ig\\_web\\_copy\\_link&igsh=aXB1bmt6MWxxc2xi](https://www.instagram.com/p/DN0i0cx3LPa/?utm_source=ig_web_copy_link&igsh=aXB1bmt6MWxxc2xi)

Gucci. (2022). Gucci and Oura collaboration.

[https://www.gucci.com/us/en/st/stories/article/gucci-oura?srsltid=AfmBOoo-IluW7SBVxIxM0TQ8KiWkt-UflJs\\_gVnhf1zylwcZnHm0twrss](https://www.gucci.com/us/en/st/stories/article/gucci-oura?srsltid=AfmBOoo-IluW7SBVxIxM0TQ8KiWkt-UflJs_gVnhf1zylwcZnHm0twrss)

Horsepower & Heels. (2025). Breast Cancer Research Foundation sponsors.

<https://horsepowerandheels.com/sponsors/breast-cancer-research-foundation/>

Levi's. (2020). Levi's Trucker Jacket with Jacquard by Google.

[https://www.levi.com/US/en\\_US/blog/article/levis-trucker-jacket-with-jacquard-by-google?srsltid=AfmBOopXDyibCsvbtQbalkPkmnd0rQr6B4V7EKhuR3NUEAsHTjURgKgN](https://www.levi.com/US/en_US/blog/article/levis-trucker-jacket-with-jacquard-by-google?srsltid=AfmBOopXDyibCsvbtQbalkPkmnd0rQr6B4V7EKhuR3NUEAsHTjURgKgN)

Meta. (2023, September 27). Introducing the new Ray-Ban | Meta Smart Glasses.

<https://about.fb.com/news/2023/09/new-ray-ban-meta-smart-glasses/>

Oura. (2025). Oura official website. [https://ouraring.com/?](https://ouraring.com/)

<https://ouraring.com/srsltid=AfmBOorobjkDYmPwAm0z5FuFC4pQxHUAKPaKYE7IY4W1aCGYXKBhfwi>

Pelotonia. (2024). Victoria's Secret Global Fund awards. <https://www.pelotonia.org/vsfund/awards>

Pinterest. (2024). Pinterest board. <https://pin.it/5B4oHnfXK>

Pinterest. (2025). Pinterest board. <https://pin.it/6DTh3aCiB>

Victoria's Secret. (2025). Bras catalog. <https://www.victoriassecret.com/us/vs/bras-catalog/5000010541?brand=vs&collectionId=34f84a5d-8f98-4b0a-a816->

[https://www.victoriassecret.com/us/vs/bras-catalog/5000010541?brand=vs&collectionId=34f84a5d-8f98-4b0a-a816-732d4ee39c0f&limit=180&orderBy=REC&priceType=regular&productId=f457c7b8-2070-40f9-b865-b714116f78e2&stackId=68ebf63e-0a5f-4a8c-a580-7d1cfab8d4d0&genericId=11273639&choice=36F3&product\\_position=20&stack\\_position=1&stack\\_count=1&dataSource=manual-collection](https://www.victoriassecret.com/us/vs/bras-catalog/5000010541?brand=vs&collectionId=34f84a5d-8f98-4b0a-a816-732d4ee39c0f&limit=180&orderBy=REC&priceType=regular&productId=f457c7b8-2070-40f9-b865-b714116f78e2&stackId=68ebf63e-0a5f-4a8c-a580-7d1cfab8d4d0&genericId=11273639&choice=36F3&product_position=20&stack_position=1&stack_count=1&dataSource=manual-collection)



# APPENDIX A: TECH MODELING RESEARCH

(Aboagye et al., 2024)

## 1. Textile Based Antenna Sensors (Primary Selected Method)

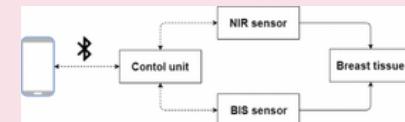
“The proposed system is envisioned as a Smart Bra that can provide an easy interface for women who require continuous breast monitoring in the comfort of their homes.” Utilizes microwave imaging and a designed textile sensor. This detection device design is wearable with dimensions of  $24 \times 45 \times 0.17 \text{ mm}^3$ . This research was primarily conducted in Egypt and published in January 2023. (Elsheakh et. al., 2023)

## 2. Wearable Honeycomb Ultrasound Scanner (Additional Method that could Substitute in Product Development Phase)

The device is a wearable ultrasound scanner that can be incorporated into a bra. It's portable and easy to use, while providing real-time, user-friendly monitoring of breast tissue. For the device to become wearable, the researchers designed a flexible, 3D printed patch with honeycomb-like openings, utilizing magnets to attach to a bra that has openings to which the ultrasound scanner can attach to the skin. MIT researchers developed the concept and product in 2023. (Trafton, 2023). The end use of this product is slightly different than the goal of “The Fearless Collection”, so the design concept and technology were recorded but not fully integrated.

## 3. Integrated Sensors for Early Breast Cancer (Additional Method that could Substitute in Product Development Phase)

This model is a wearable, low-cost cost and power-efficient early breast cancer detection device, which utilizes a combination system with Bioimpedance spectroscopy (BIS) and Near Infrared Spectroscopy (NIRS). The results from both systems are combined and reported through Bluetooth, connecting to a custom-designed mobile app on the user's phone (Farag et al., 2018). The proposed sensors have had high success; however, the system is not yet designed to be integrated into textile form. Therefore, the study helped support the research and innovation stage, but could not yet be implemented without further development.



## 4. Breast Cancer Detection with UWB Vest (Additional Method that could Substitute in Product Development Phase)

“This paper presents a study on a monitoring vest embedded with multiple flexible ultrawideband (UWB) antenna elements used for the detection of possible breast cancer tissue.” The antennas are small and made of flexible materials, and fill out a large vest band around the patient. The sensors identify differences in radio channel characteristics. This research was primarily conducted in Italy and published in 2022 (Särestöniemi et al., 2022). Utilizing UWB in this technique makes a lot of sense for the product, because of its low cost, low power, and small size devices. However, the quantity of sensors utilized in the theorized system as a vest doesn't translate well to the quantity of sensors that can fit into a bra. Therefore, the technique was regarded, but not chosen.